A Work Project, presented as part of the requirements for the Award of a Master's degree in Management from the Nova School of Business and Economics.

Carbon Credit Card Services and the Impact Potential on CO2 Emissions in the EU – A Scenario-Based Modeling Approach

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Abstract

The scenario-based modeling approach applies the conceptual background of section 3 for the impact assessment of CCCS. After discussing the persona characteristics, the calculation steps are conducted and its results among the three scenarios are analyzed. In conclusion, recommendations for the CCCS providers as well as an outlook for the future are given. The model calculations reveal a substantial contribution potential of CCCS towards the reduction of CO2 emissions in the EU. Depending on the behavioral change that occurs, the impact potential is assessed to a reduction of -11.6% to -15.2% of annual EU CO2 emissions by 2030.

Keywords

Climate Change Mitigation

CO2 Reduction

Impact Measurement

Modeling

Carbon Credit Card Services

Survey

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4.2 Model calculations	**What are the model's sub-results and what is their implication?** ➢ How do the calculations among the scenarios work? ➢ What is the sub-result of each calculation step in the model? ➢ What is the implication of the results?	> External research > Model calculations
4.3 Model Output	**What is the impact potential of the CCCS providers in the different scenarios?** ➢ How does the final impact assessment work? ➢ What impact can the CCCS providers ultimately have in the model scenarios?	> Impact calculations > Impact modeling
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Survey Results

In order to receive a better understanding of consumer behavior and their willingness to change, a Europe-wide online survey was conducted

Description of the main characteristics of the conducted survey

The Survey

569
respondents

Survey of residents within the European Union to understand the current behavior as well as the willingness to change behavior which could lead to an impact of Carbon Credit Card Services on decreasing carbon emissions over a 10-year timeframe

Respondents

19
Countries

58.0%
Female

41.5%
Male

0.5%
Other

Age
15-64

Survey published **October 25th**

November 14th Survey Completed

Source: Survey Evaluation Carbon Credit Cards (2021).

To allocate the survey participants to the personas, a funnel including the answers to 5 different questions was used

Description of the funnel used for the determination of persona allocation*

1 Initial Allocation

Based on the frequency of the actions taken from the choices of:

Do you take any of these actions to reduce climate change?

- Recycling
- Use renewable energy sources
- Vegetables instead of meat
- Public transport / bike instead of car
- Reduce water waste
- Reduce energy waste
- Avoid flights

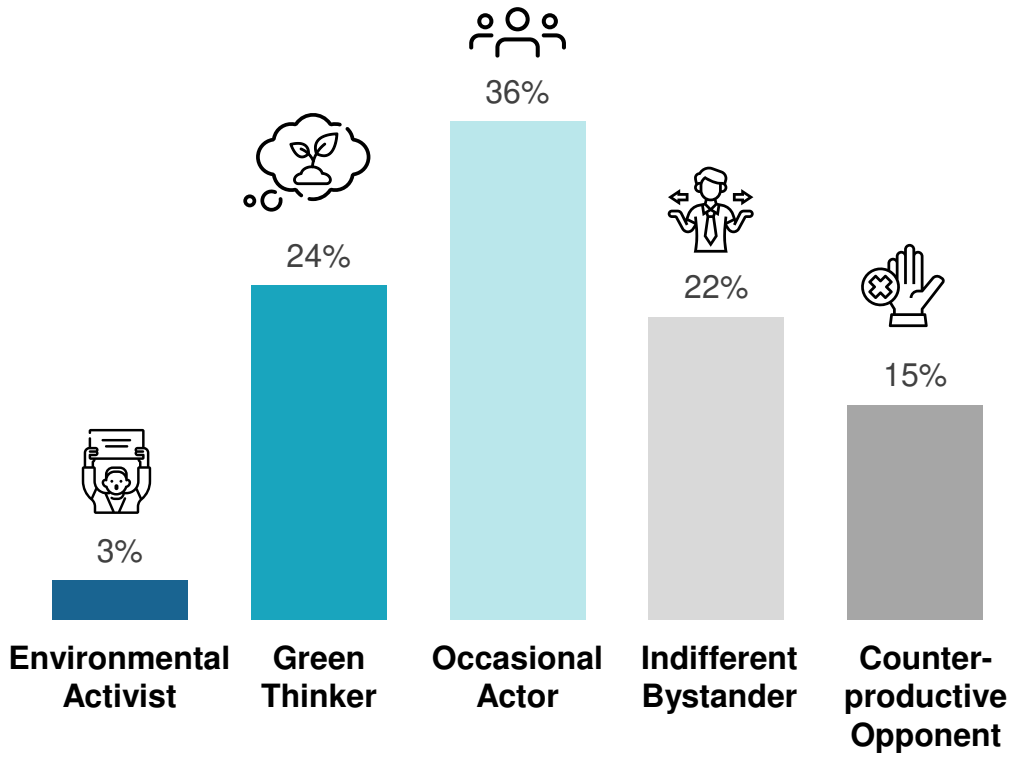
an initial allocation to the personas was undertaken

2 Further breakdown

*Afterwards, based on the answers to the following 4 questions, the respondents could **either remain** in the former persona **or incrementally be downgraded** to a less sustainable persona:*

- **What is your main way of transportation and how many km do you travel with it per week?**
- **How many times per year do you travel by plane?**
- **Do you believe that there is an ongoing climate crisis?**
- **Are you aware of your carbon footprint?**

Leading to the following persona allocation among the respondents

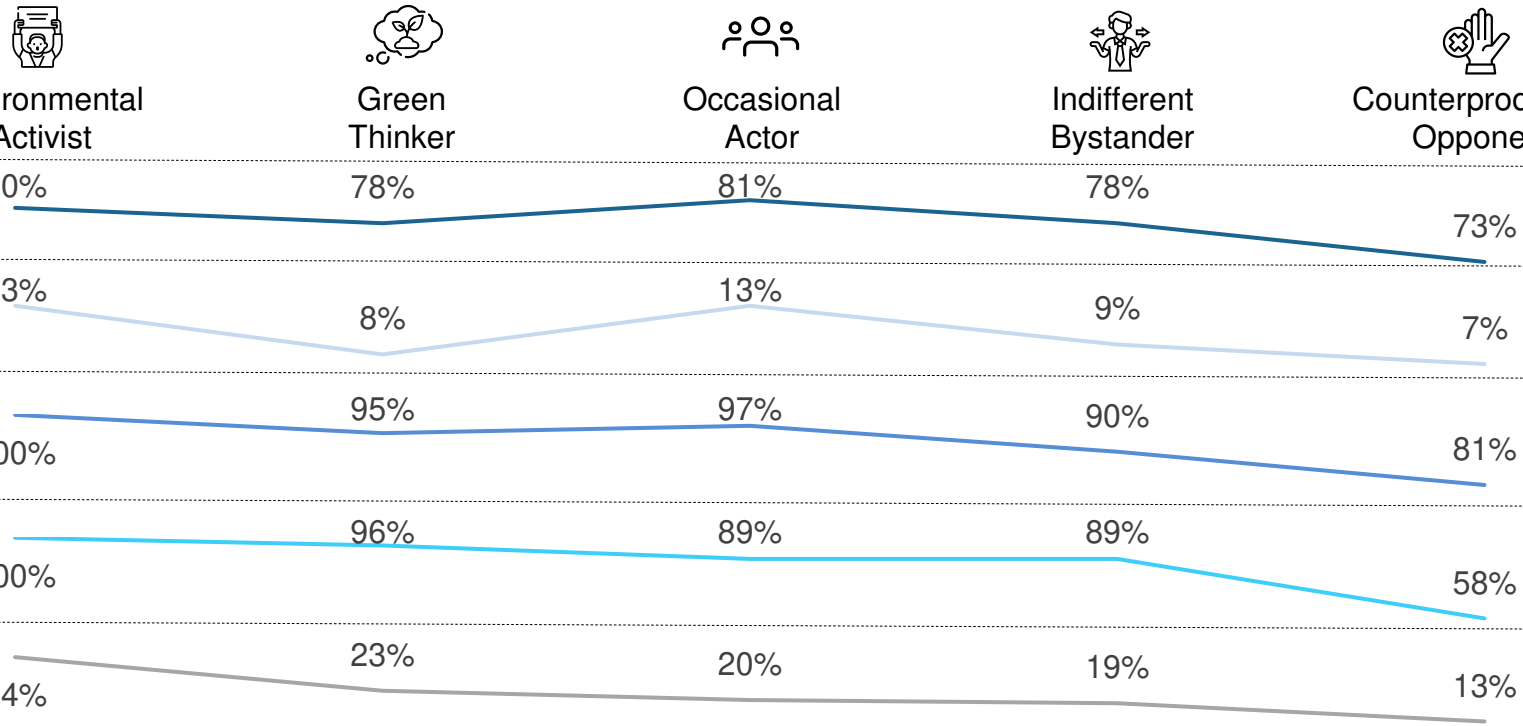


For a more detailed description of the determination funnel, please consult this slide.

Source: Survey Evaluation Carbon Credit Cards (2021).

Based on the survey results, the 5 different personas can be closer described by several behavioral characteristics

Characterization of Personas



Key insights

- The young age of the Carbon Credit Card Services is reflected in the **low awareness** of its existence among participants
- The willingness to use CCCS is high which means that a **high penetration rate in the addressable population** can be assumed
- The willingness to change behavior is high, thus **many people are willing to reduce their emissions**. Nevertheless, for instance 42% of the Counterproductive opponents are not willing to change, thus are expected to remain in this category
- The overall existence of the willingness to offset means that **all personas would have lower net emissions** in the end

Source: Survey Evaluation Carbon Credit Cards (2021).

8-step Calculation Approach

Numerical assessment with the conceptual model

Using the input from the survey and market research data, the calculations along the 8 steps of the model can be conducted

Overview of the 8 calculation steps in the model

			Based on:
1	Total Users	What is the expected number of users of CCCS?	• *Survey data* • *Market research data*
2	Persona Allocation	How are the total users allocated across the personas and how does the allocation evolve?	• *Survey data* • *Simulations*
3	Carbon Factor	What are the average emissions per € spent for the categories in high and low emission products?	• *Market player data* • *Data forecast*
4	Expenses Allocation	How do the personas allocate their budget among high and low emission products?	• *Survey data* • *Assumptions*
5	Individual Emissions	Based on credit card purchases, how many tons of CO2 does an individual per persona category emit annually?	• *Survey data* • *Model calculations*
6	Total Emissions	Based on individual emissions and persona allocation, how many tons are emitted annually by CCCS users?	• *Survey data* • *Model calculations*
7	Offsetting	How many tons of their emissions do the personas across categories offset annually?	• *Survey data* • *Model calculations*
8	Output	What is the total potential impact of CCCS?	• *Model calculations* • *Scenario assumptions*

The total users within the next years are calculated based on a penetration rate that is retrieved from the participants' willingess to use CCCS

Calculation method and result for the total users of CCCS for the three considered years

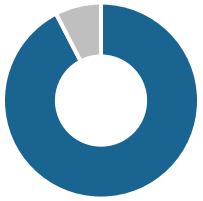
Total user calculation

Addressable Population ⊠ **Penetration Rate** = **Total Users**

Penetration Rate

Generated through:

- Are you willing to use a carbon credit card?
- If yes, when would you like to start?

	2021	2025	2030
Addressable Population (in M)	 276	 271	 269
Penetration Rate	 24%	 78%	 92%
Total Users	65 million	211 million	248 million

Source: Survey Evaluation Carbon Credit Cards (2021) and CO2 Reduction Impact Model (2021).

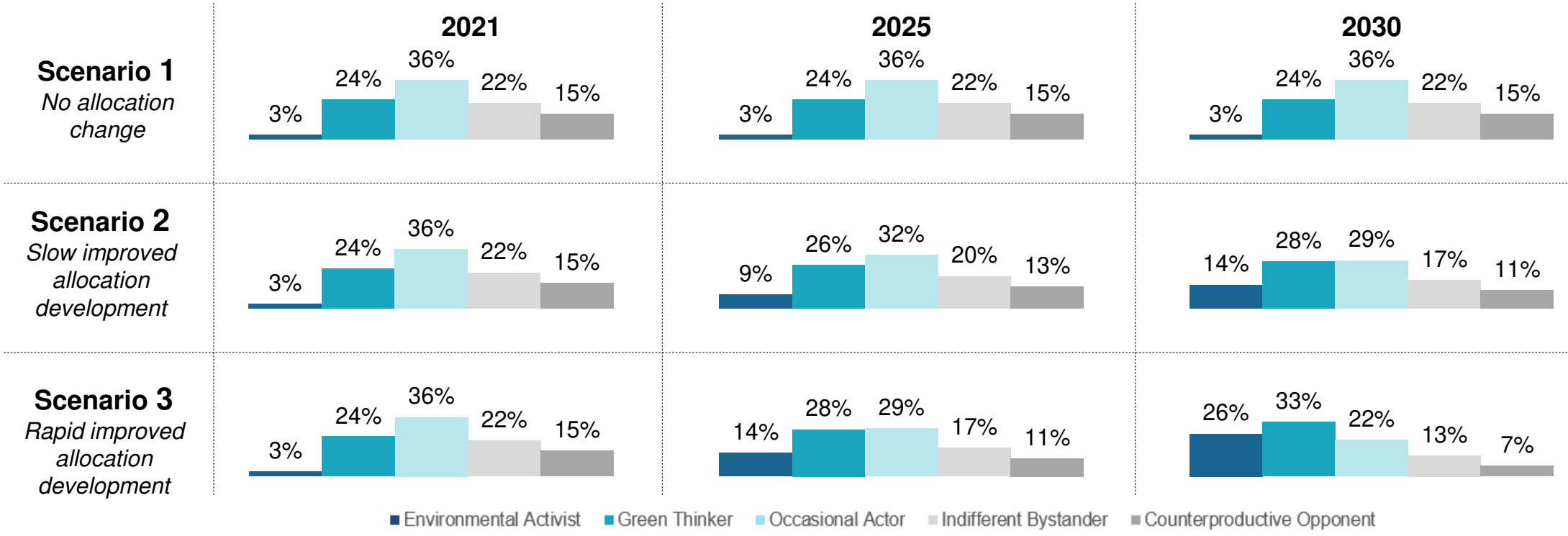
While scenario 1 assumes no change in behavior, the scenarios 2 & 3 are depicted by an increase in the share of sustainable personas

Overview of the persona allocation development among the three scenarios

Based on the **personas willingness to change***, different assumptions were used on how fast the advancement to a more sustainable persona is reached

The different assumptions for the persona allocation are the only inputs that differ between the three scenarios.

Leading to the following development in persona allocation:



*Survey question: *If you could track your carbon footprint and you knew that it was higher than of the average person in your country, would you change your consumption behavior to reduce it?*

Source: Survey Evaluation Carbon Credit Cards (2021) and CO2 Reduction Impact Model (2021).

In accordance with the procedure of the players' measurement indexes, the emission calculation is based on emissions per € spent in different categories

Overview of the emissions per category used as the input of emission measurement of purchases

Emissions per € spent per category in 2021*:

	High emission products	Low emission products
Transportation	1.20 kg / €	0.60 kg / €
Nutrition	0.91 kg / €	0.38 kg / €
Housing	3.20 kg / €	1.00 kg / €
Products / Services	0.50 kg / €	0.21 kg / €

Key insights

- Due to the differentiation between high and low emission products, more/less **sustainable purchasing and consumption decisions can be determined**
- The overall descending tendency of the emissions is an accelerator towards lower emissions which yet are also displayed in the development of the total emissions in the EU
- Housing is the category with highest emissions as the **product category** "Electricity, Gas, Steam and air condition" **with the highest emissions** among all categories is **belonging to housing**

For the following years (2025 & 2030), **descending emissions are assumed** due to technological advancements and more sustainable production chains. The **reduction percentage** per emission category is **based on the 10-year emission forecast**.

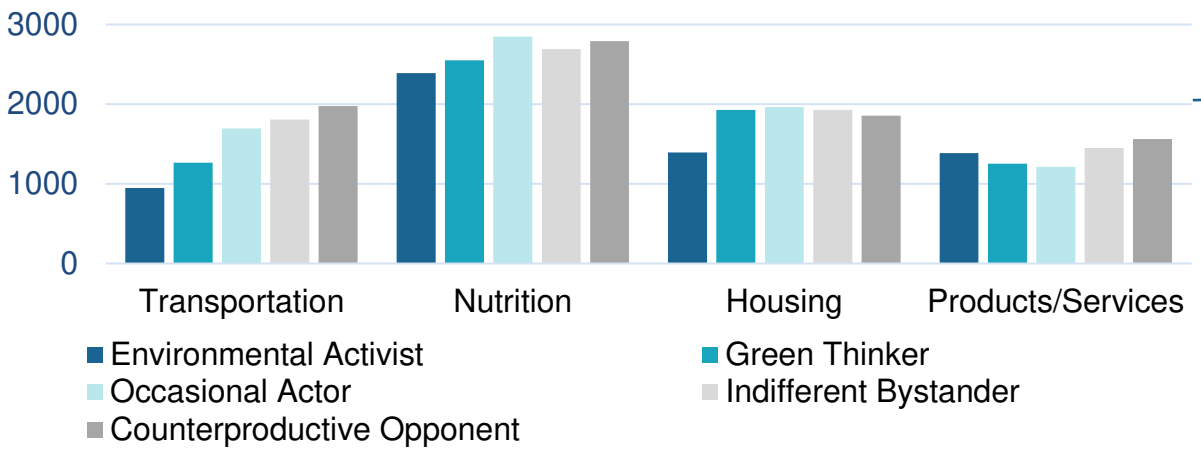
* The data was obtained from the market player Enfuce and constitutes the data for the Finnish market.

Source: Interview with Ilona Kivimäki (2020), Eurostat (2020b), Eurostat (2020c), European Environment Agency (2019a) and 10-year Emission Development (2021).

The personas are assumed to allocate their annual budget towards high and low emission products within the emission categories

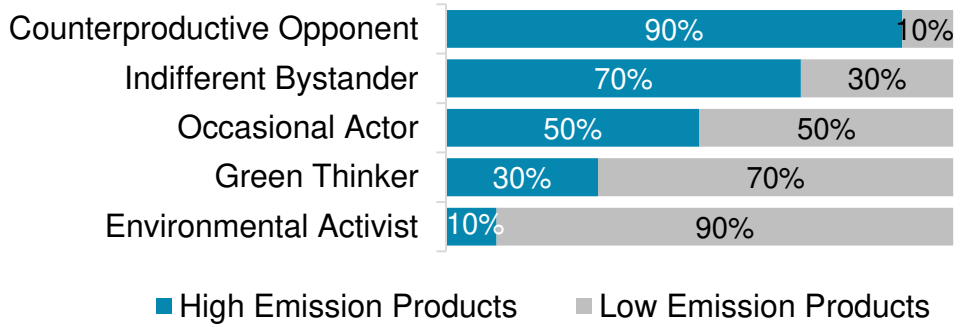
Overview of available budgets per emission category and allocation among high and low emission products

Annual budget per spending category among personas (in €)*



Allocation among high and low emission products

The available budget per category is allocated to high and low emission products according to the following ratios:



Key insights

- Expenses for flights are allocated completely to high emission product expenses
- The highest expenses can be found in the nutrition category with averagely 36% of the total expenses in the categories
- In most cases, there is an increase in total expenses from most to least sustainable personas observable
- The budget allocation is in accordance with the underlying characteristics of the personas, meaning that the allocation to high emission products increases with the decrease of sustainability of a persona

* The budget was obtained by evaluating several survey questions which asked for the expenses for the different product categories.

Source: Survey Evaluation Carbon Credit Cards (2021) and CO2 Reduction Impact Model (2021).

The individual measurable emissions per persona category are calculated with the average emissions per € spent and budget allocation to the categories

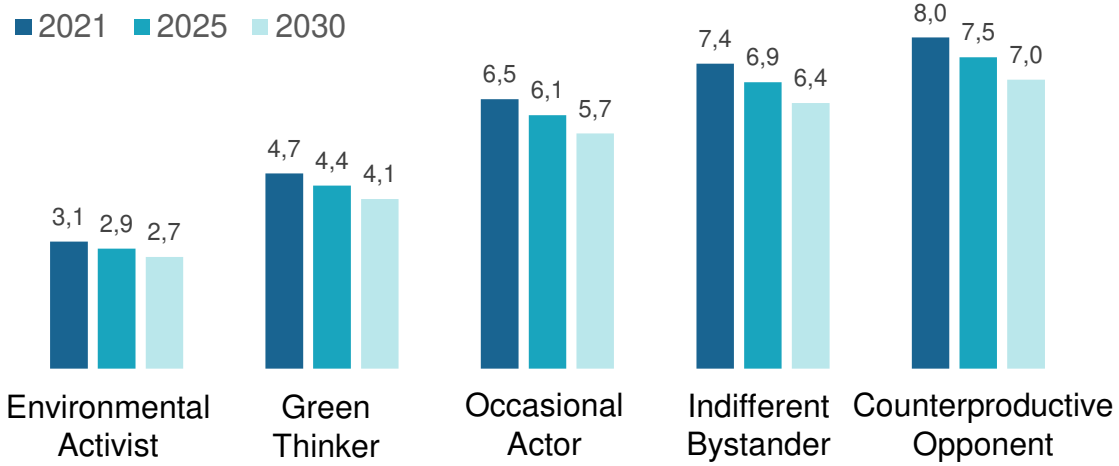
Calculation of the measurable annual emissions per individual among persona categories

Formula

(High emission products: *Average emissions per € (in kg)* × *Average annual expenses (in €)* + Low emission products: *Average emissions per € (in kg)* × *Average annual expenses (in €)*) × *Average % of purchases made by credit card* ÷ *1.000* = ***Measurable emissions per year per individual persona (in t)***

Result

Measurable emissions per year per individual persona *(in t)*



Analysis

- The resulting emissions are **used among all three scenarios**
- All personas reveal a **slight decrease in annual emissions** within the 10 years which is caused by the decrease in emissions per € spent due to technological advancements and more sustainable production chains
- The emissions of the Counterproductive Opponent are 2.6 times higher than of the Environmental Activist
- Since the calculated emissions are only the addressable emissions, the **real annual footprint per persona would be higher**
- Since the categorization of products and according emissions is simplified, the results are just a rough estimate

Source: Survey Evaluation Carbon Credit Cards (2021) and CO2 Reduction Impact Model (2021).

Based on the individual emissions per persona category, the total measurable emissions across all personas in the EU can be obtained

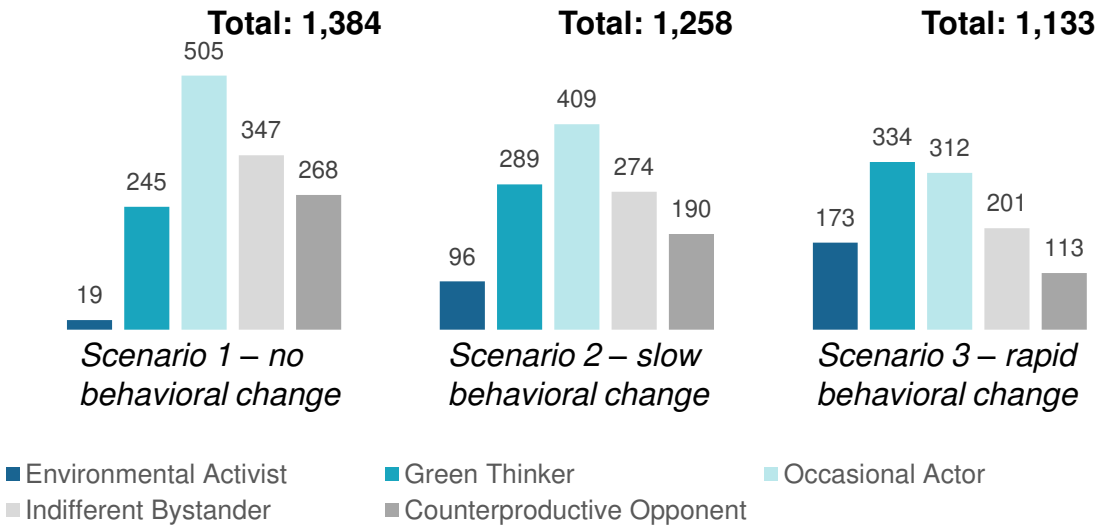
Calculation of the measurable annual emissions across all personas in the EU

Formula

Measurable emissions per year per individual persona (in t) × *% of total users belonging to the persona* × *Total users (in m)* = ***Total measurable emissions in the EU per persona category (in megatons)***

Result

Emission allocation per persona category across the 3 scenarios in 2030 *(in megatons)*



Analysis

- The total emissions of the Environmental Activists increase as the total number of users in this persona category increases between scenario 1 and scenario 3
- For Counterproductive Opponents, the opposite applies since the total number of users in this persona category decreases
- The **shift in persona allocation and the connected shift towards more sustainable purchase** decision are leading to lower total emissions in the EU in scenario 2 and 3
- The **total emissions in scenario 3 are 18% lower than in scenario 1**

Source: Survey Evaluation Carbon Credit Cards (2021) and CO2 Reduction Impact Model (2021).

The investment in offsetting projects is calculated using the total measurable emissions and the percentage of emissions the personas are willing to offset

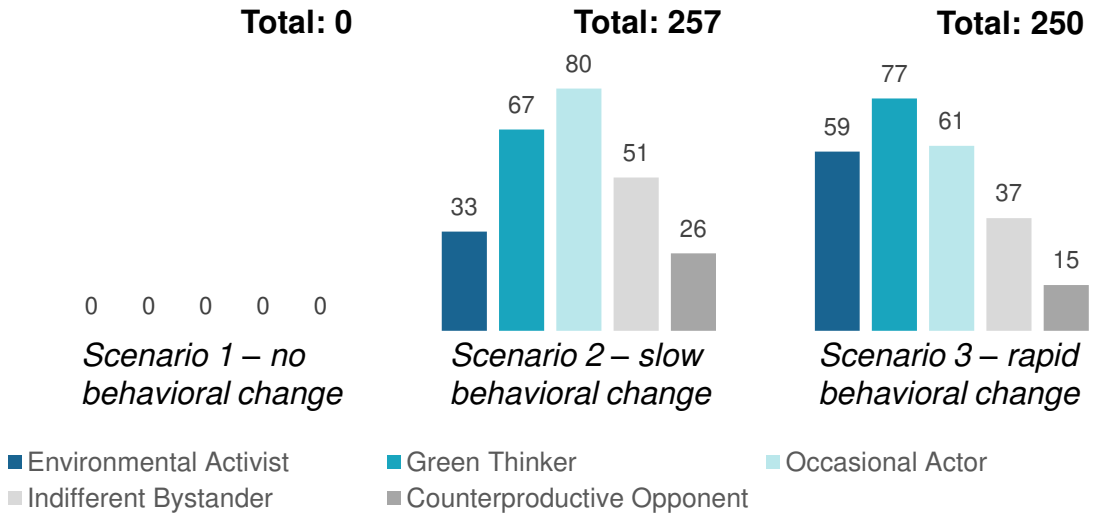
Calculation of the total emission offsetting across the personas in the EU

Formula

Total measurable emissions in the EU per persona category (in megatons) × *% of emission offsetting per persona category* = ***Total emission offsetting in the EU per persona category (in megatons)***

Result

Emission offsetting per persona category across the 3 scenarios in 2030 *(in megatons)*



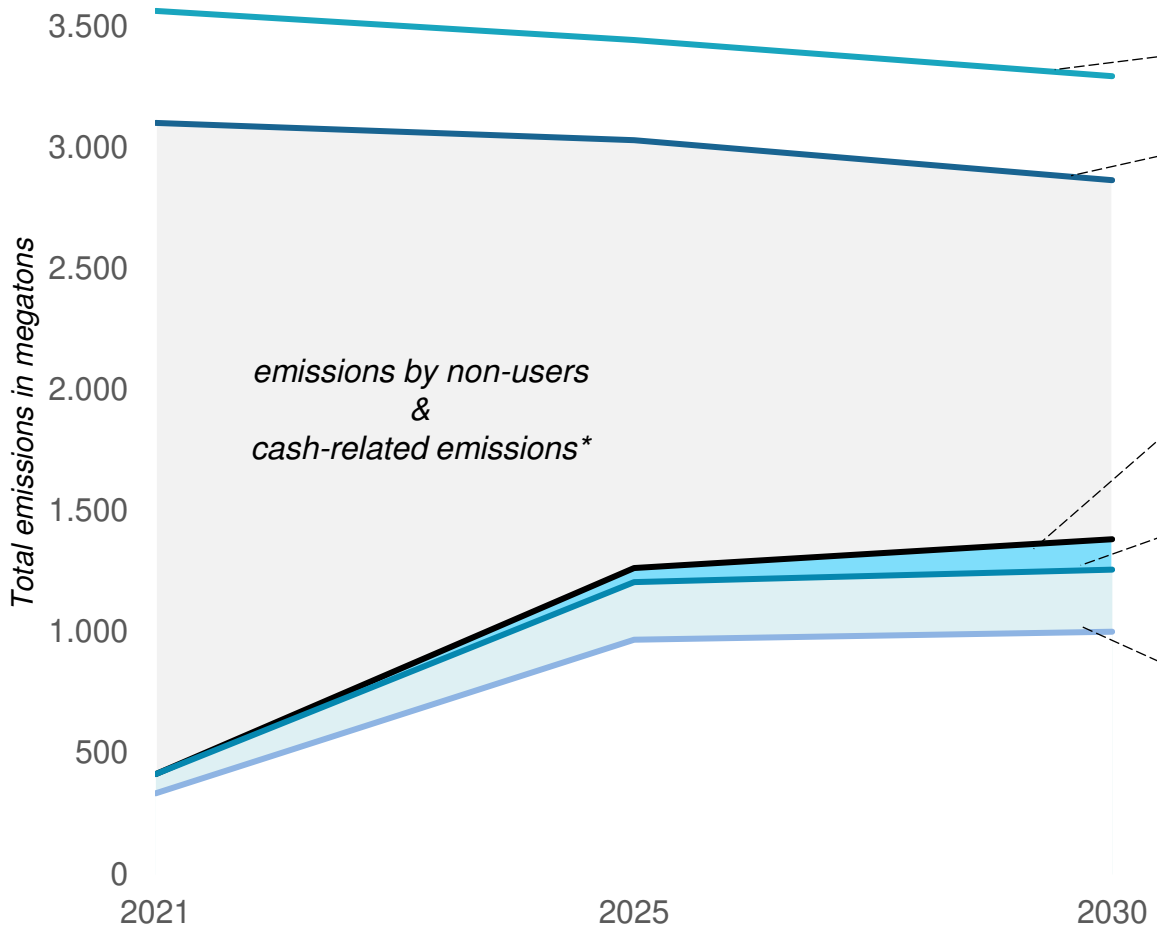
Analysis

- The **% of emission offsetting** is retrieved from the survey and is **assumed to remain stable** over the years and among the scenarios
- The offsetting is calculated separately as it is assumed to be an extra-effect caused by the usage of CCCS
- In **scenario 1, no offsetting** occurs as no change in behavior is assumed
- The total offsetting in scenario 3 is lower than in scenario 2 as the offsetting percentages remain stable while the base (total measurable emissions) decreases

Source: Survey Evaluation Carbon Credit Cards (2021) and CO2 Reduction Impact Model (2021).

The reduction impact potential of CCCS is calculated by comparing the emission development of scenarios 2 & 3 to the development of scenario 1

Impact calculation of scenario 2 – slow behavioral change



Graph explanation and impact calculation

Projected EU emission development under current measures

As 13% of the emissions are not covered by the emission categories, the measurable emissions are lower

Scenario 1 user emission development – as no behavioral change is assumed, it simply reveals the emissions by the users of CCCS

Scenario 2 emission development: due to behavioral change, the emissions by CCCS users are lower than in scenario 1

→ **Impact:** Scenario 1 emissions in 2030 ***1,384***
- Scenario 2 emissions in 2030 - ***1,258***
= 125

Scenario 2 emission development under the additional impact of offsetting, which leads to lower net emissions

→ **Impact:** ***257***

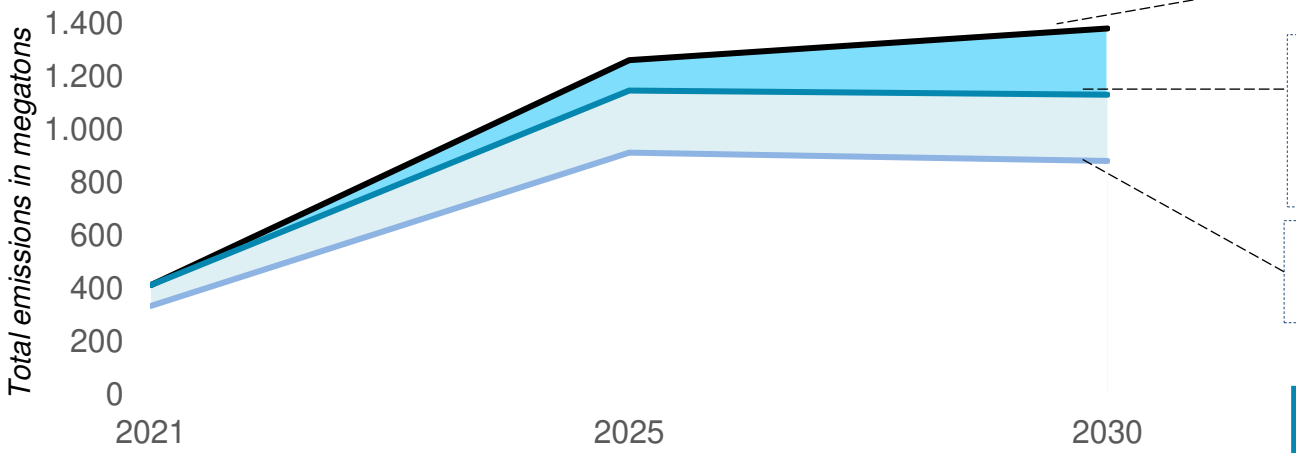
Total impact in scenario 2:
125 + 257 = **382**
megatons reduction of annual CO2 emissions by 2030

* As the amount of CCCS users is rising from 2021 to 2030, the gap between addressable emissions and user emissions is shrinking

Source: Eurostat (2020b), Eurostat (2020c), European Environment Agency (2019a), 10-year Emission Development (2021) and CO2 Reduction Impact Model (2021).

The impact calculation of scenario 3 leads to a potential reduction of 501 megatons of annual CO2 emissions in the EU

Impact calculation of scenario 3 – rapid behavioral change



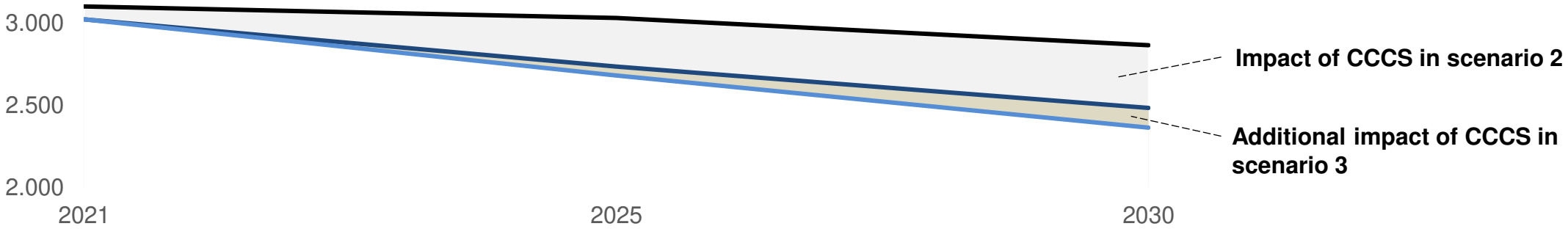
Scenario 1 CCCS user emission development

Scenario 3 emission development with rapid behavioral change
→ **Impact:**
Scenario 1 emissions in 2030 ***1,384***
- Scenario 3 emissions in 2030 - ***1,133***
= 251

Scenario 3 emission development with offsetting:
→ **Impact:** ***250***

Total impact in scenario 3:
251 + 250 = **501**
megatons reduction of annual CO2 emissions by 2030

Impact of scenario 2 & 3 on the projected development of the total measurable emissions in the EU:



Source: Eurostat (2020b), Eurostat (2020c), European Environment Agency (2019a), 10-year Emission Development (2021) and CO2 Reduction Impact Model (2021).

Recommendations & Outlook

In order to reach some of the optimistic model assumptions, the CCCS providers need to implement some advancements in different areas

Overview of model limitations and limitations of assumptions

Examples of survey limitations

- Survey participants might under-/overestimate the frequency of positive or negative behavior
- The interpretation of “likely vs. not likely” to use CCCS can be different among participants
- The number of participants is not necessarily representative, just gives an idea of the potential consumer behavior

Examples of impact assessment limitations

- A person might also change the behavior for cash spending and non-addressable spending, which is not reflected in the model → real impact might be even bigger
- Other factors might also affect the change in consumption behavior (increased public discussion, sustainable movements etc.)
- For instance, COVID will have a big impact on emission reduction in 2020 due to cutback in international & local travels etc.

There are some optimistic assumptions in the model which assume

- **high penetration rate**
- **substantial consumer change**
- **high offsetting investments**

In order to reach these underlying assumptions, the CCCS providers need advancements in the areas of

- **User acquisition**
- **Index Accuracy**
- **Awareness**
- **User Experience**

How can the CCCS providers attain advancements in these areas?

Based on the previous player analysis, improvement potential is observable in the areas of user acquisition, index accuracy, awareness and user experience

Recommendations on strategies to fulfil the model assumptions*

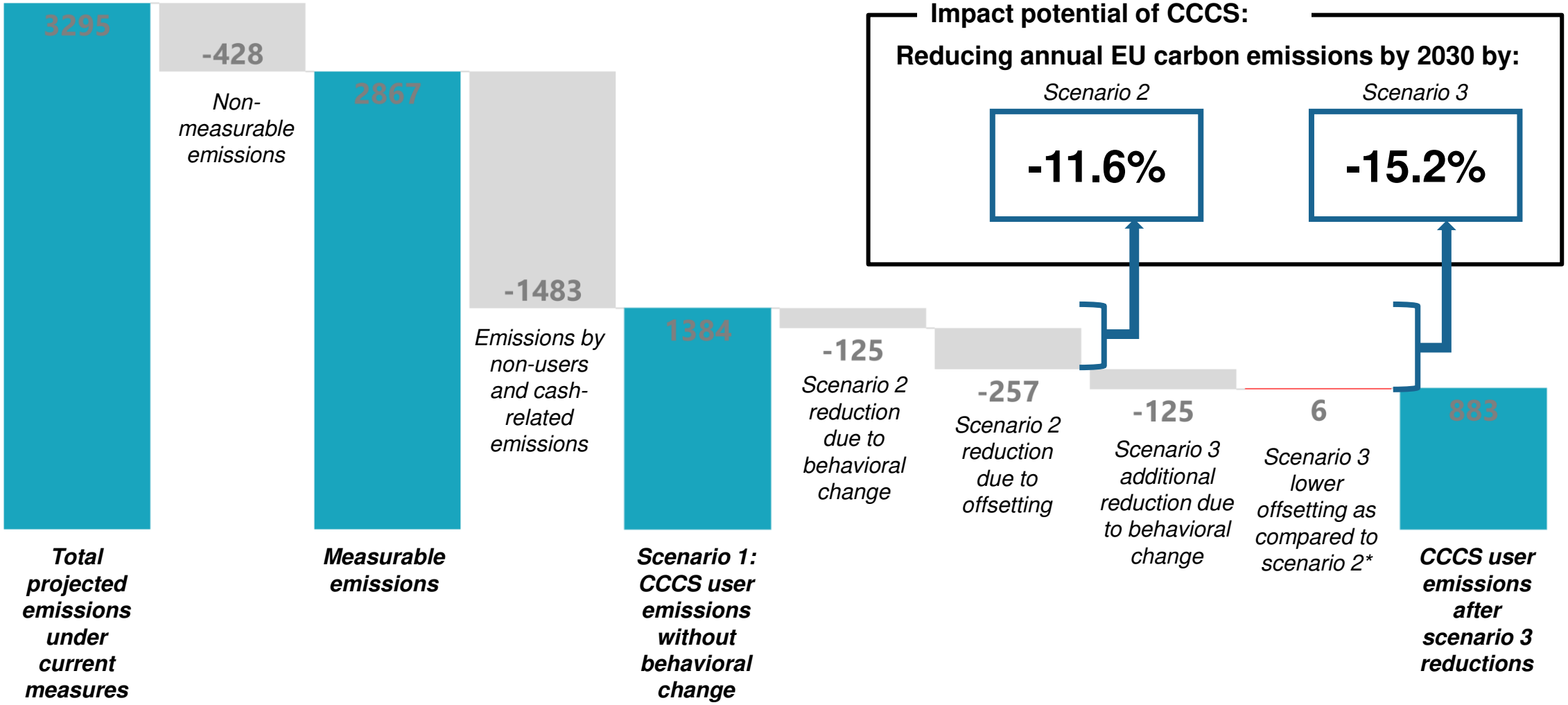
Improvement Area	Recommendations	Expected Impact
 **User acquisition**	• **Expansion strategy:** adopt strategy of player Enfuce → most promising to reach high user amount due to collaboration with banks • **Referral Marketing Program** to grow customer base: word of mouth initiatives • **Award Program** with discounts to encourage usage	**High penetration rate** ➢ High reach and user growth as no change in bank is required ➢ Referral and awards constitute multiplicator for rapid expansion
 **Index Accuracy**	• Detailed information on purchased products due to: → Collaboration with **multichannel marketing platforms** (e.g., PayBack) → Collaboration with **digital receipt providers** • Detailed information on emissions among the supply chain due to: → Collaboration with **producers**	**Increased accuracy and trust** ➢ Obtain detailed information on basket of products connected to a credit card purchase ➢ Producers providing detailed information on the emission among the value chain ➢ Ultimately higher trust into indexes due to increased accuracy
 **Awareness**	• **Carbon Meter**: setting an imaginary limit with notifications in the app which is used to map the individual's carbon footprint • Display **cost of environmental damage** connected to a purchase of a product	**Higher ratio of sustainable personas** ➢ Higher knowledge about impact of individual behavior on carbon emission can lead to behavior improvement
 **User Experience**	• **Offsetting:** icon placed next to the listing of a purchase to facilitate and enhance the experience of offsetting investment • **Gamification:** create a community and a social platform which can increase interest and user experience	**More commitment and offsetting investments** ➢ Higher probability of investment in offsetting projects ➢ Social aspect increases commitment and long-term interest

A more detailed explanation of the recommendations is provided in the appendix.

Source: to be found in the respective appendix slides.

Based on the model, the potential reduction percentage due to CCCS is up to 15.2% of the annual CO2 emissions in the EU by 2030

Breakdown of emissions and impact potential assessment (in megatons)



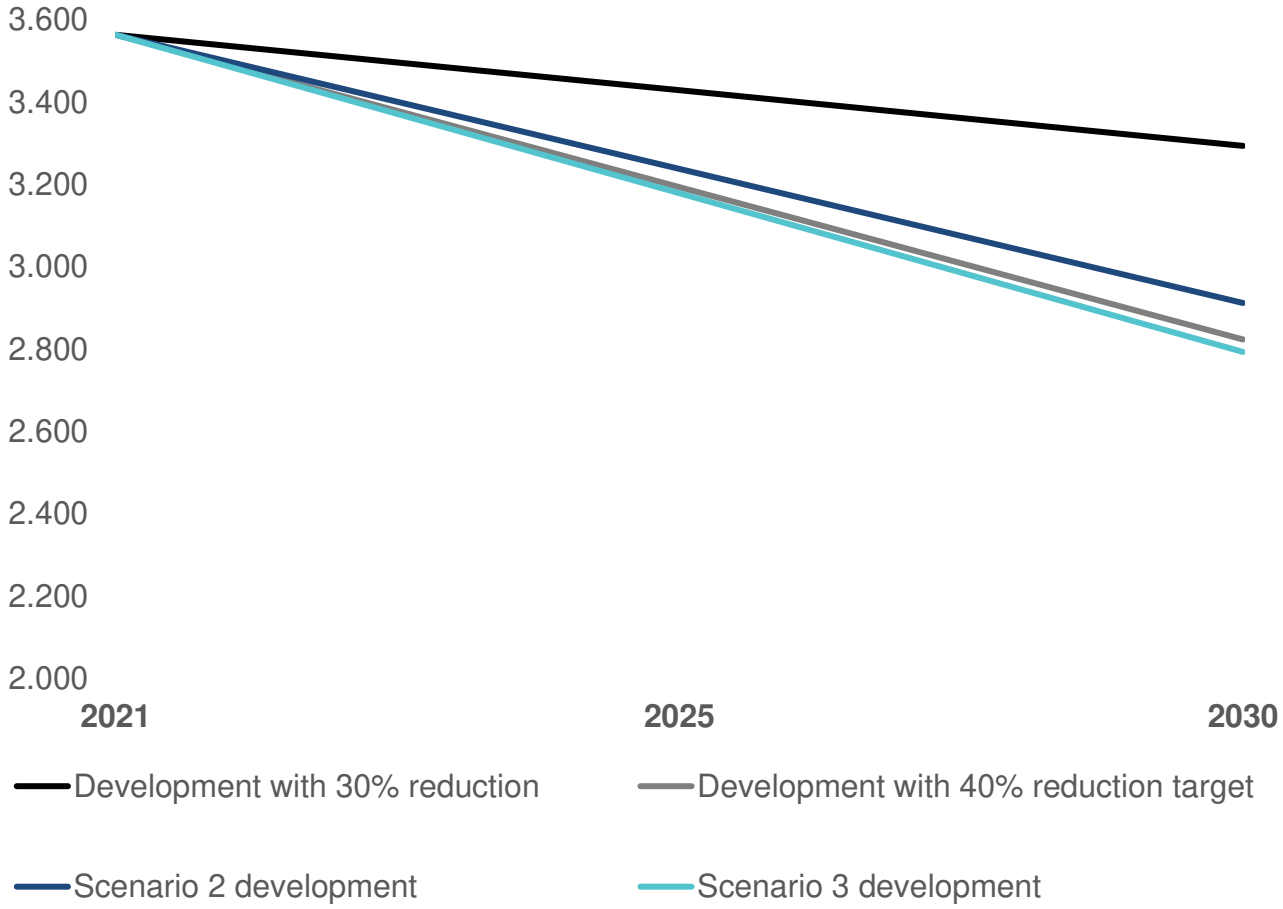
*The offsetting in scenario 3 is lower than in scenario 2 as the personas offset the same percentage but the base (the emissions) is lower.

Source: Eurostat (2020b), Eurostat (2020c), European Environment Agency (2019a).

The CCCS providers can play a substantial role towards reaching the EU 2030 target but for the prevention of an irreversible climate crisis more is required

Comparing target and impact – can CCCS help to reach the EU reduction target of 40% by 2030?

EU emission development for different scenarios by 2030



Outlook

Driving change

- A successful launch and expansion of CCCS can help to reach the EU-reduction target or have a meaningful contribution towards reducing emissions
- The impact is reached by increasing awareness of individual impact and hence driving consumer change

Depending on consumers' willingness

- Yet, this requires the willingness of a substantial amount of people to change consumption behavior and live more sustainable

A bigger scope is required

- In order to prevent the irreversible climate crisis, not only the EU-countries but countries all over the world need to change and possibly more severe initiatives* might be required in the future

A possible approach towards connecting CCCS to a more severe initiative, can be found in the appendix.

Source: Eurostat (2020b), Eurostat (2020c), European Environment Agency (2019a), 10-year Emission Development (2021) and CO2 Reduction Impact Model (2021).

Key takeaways – A scenario-based modeling approach

Sections	Research questions
Key Question	**What is the total carbon reduction potential of the CCCS providers over the next 10 years?**
4.1 Survey & Personas	➢ **Survey –** 569 respondents from 19 countries to generate personas with different levels of sustainable behavior ➢ **The funnel –** Criteria allocating a respondent to a persona ➢ **Personas –** Environmental Activist, Green Thinker, Occasional Actor, Indifferent Bystander, Counterproductive Opponent
4.2 Model calculations	➢ **Individual emissions** – the Counterproductive Opponent's emissions are 2.6 times higher than of the Environmental Activist ➢ **Total emissions** – The shift in persona allocation is leading to lower total emissions in the EU in scenario 2 and 3 ➢ **Offsetting** – the reduction due to offsetting has a substantial impact on the overall emission reduction
4.3 Model Output	➢ **Scenario 2** – including the effect of behavioral change and offsetting, the reduction potential of annual CO2 emissions results to 382 megatons if scenario 2 persona allocation will occur ➢ **Scenario 3** – due to more severe behavioral change, the impact in this scenario amounts to 501 megatons ➢ **Overall emissions** – in both scenarios, CCCS has a substantial impact to the reduction of CO2 emissions
4.4 Recommen-dations & Outlook	➢ **Strategies** – in order to attain the impact, the CCCS players should implement advancements in the areas of user acquisition, index accuracy, awareness and user experience ➢ **Impact** – despite the vast impact potential of CCCS, there is a high dependency on the real willingness to change of consumers; in order to prevent an irreversible climate crisis, all countries worldwide need to act

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Reduction Impact Model and Survey:

Schweers, Sebastian., Lindström, Simon., Carrez, Nathalie, and Kreß, Teresa. *CO2 Reduction Impact Model,* V1 (January 04, 2021), distributed by Nova School of Business and Economics.

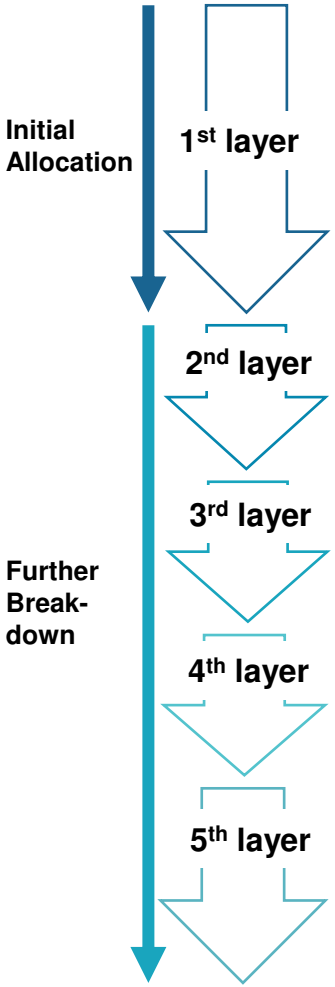
Schweers, Sebastian., Lindström, Simon., Carrez, Nathalie, and Kreß, Teresa. *10-year Emission Development,* V1 (January 04, 2021), distributed by Nova School of Business and Economics.

Schweers, Sebastian., Lindström, Simon., Carrez, Nathalie, and Kreß, Teresa. *Survey Evaluation Carbon Credit Cards,* V1 (January 04, 2021), distributed by Nova School of Business and Economics.

Contents

Aiming to allocate the survey participants to a certain persona category, a funnel including the answers to 5 different questions was used

Description of the funnel used for the determination of persona categories



Do you take any actions towards reducing climate change? (choice of 7 possible actions)

IF sum (actions taken *always* + *frequently)* > 6	➡ Level 1
ELIF sum (actions taken *always* + *frequently)* > 3	➡ Level 2
ELIF sum (actions taken *always* + *frequently* + *occasionally)* > 3	➡ Level 3
ELIF sum (actions taken *always* + *frequently* + *occasionally* + *rarely)* > 3	➡ Level 4
ELSE	➡ Level 5

What is your main way of transportation and how many km per week do you travel by this?

IF main way of transport = *car* AND km traveled per week > *250*	➡ Downgrade 1 level
ELSE	➡ Retain level

How many times per year do you travel by plane?

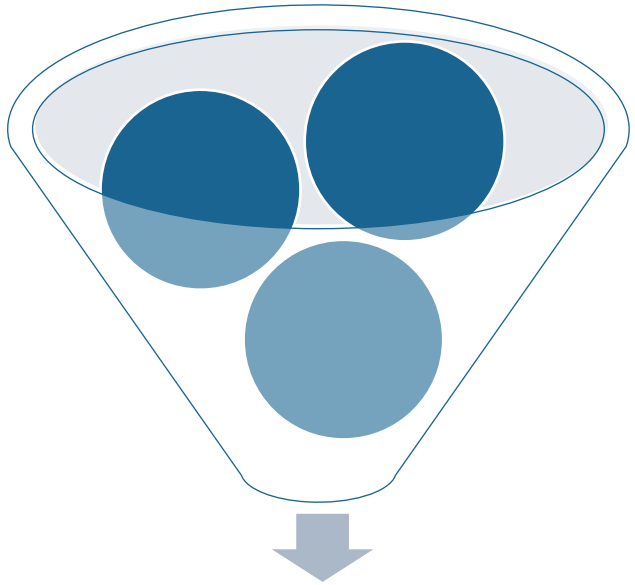
IF number of flights per year = *zero* OR *1 – 2 times*	➡ Retain level
ELSE	➡ Downgrade 1 level

Do you believe that there is an ongoing climate crisis?

IF answer = *Definitely yes* OR *Probably yes*	➡ Retain level
ELSE	➡ Downgrade 1 level

Are you aware of your carbon footprint?

IF answer = *"Yes, I track my footprint on a regular base"* OR *"Yes, I have a rough idea of that"* OR *"No, but I would like to know more about it"*	➡ Retain level
ELSE	➡ Downgrade 1 level



1. **Environmental Activist**
2. **Green Thinker**
3. **Occasional Actor**
4. **Indifferent Bystander**
5. **Counterproductive Opponent**

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Based on the previous player analysis, improvement potential is observable in the areas of user acquisition, index accuracy, awareness and user experience

Overview of recommendations and link to the respective slides with detailed explanations

Improvement Area	Recommendations	Detailed Explanation
 User acquisition	Expansion strategy	Slide 32
	Referral Marketing Program	Slide 33
	Award Program	Slide 33
 Index Accuracy	Multichannel marketing platform collaboration	Slide 34
	Digital receipt provider collaboration	Slide 35
 Awareness	Carbon Meter	Slide 36
	Cost of environmental damage	Slide 37
 User Experience	Offsetting facilitation	Slide 38
	Gamification	Slide 39

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Following the example of Enfuce's expansion strategy is promising in order to obtain a substantial user base in the short-term perspective

Explanation of the user acquisition difficulty and a possible mitigation approach

Problem outline

Need for many users:

In order to have a significant impact on the reduction of CO2 emissions, the CCCS providers need many users that are driven to change by using the service

Difficulty to obtain own user base:

As the competition in the payment services industry is high and many providers are on the market, it might be difficult for a new provider to establish the substantial user base on its own

Possible solution

Following the example of Enfuce:

Enfuce does not offer its service directly to consumers but collaborates with banks (B2B)

Therefore, the banks can add the carbon footprint measurement service to their payment cards portfolio and thus add a sustainability approach to their offering

Expected Impact

High awareness and publicity:

The awareness of the existence of CCCS can be increased for the banks' customer base. Furthermore, there is no need to change the payment card provider, which lowers the barrier to obtain a Carbon Credit Card

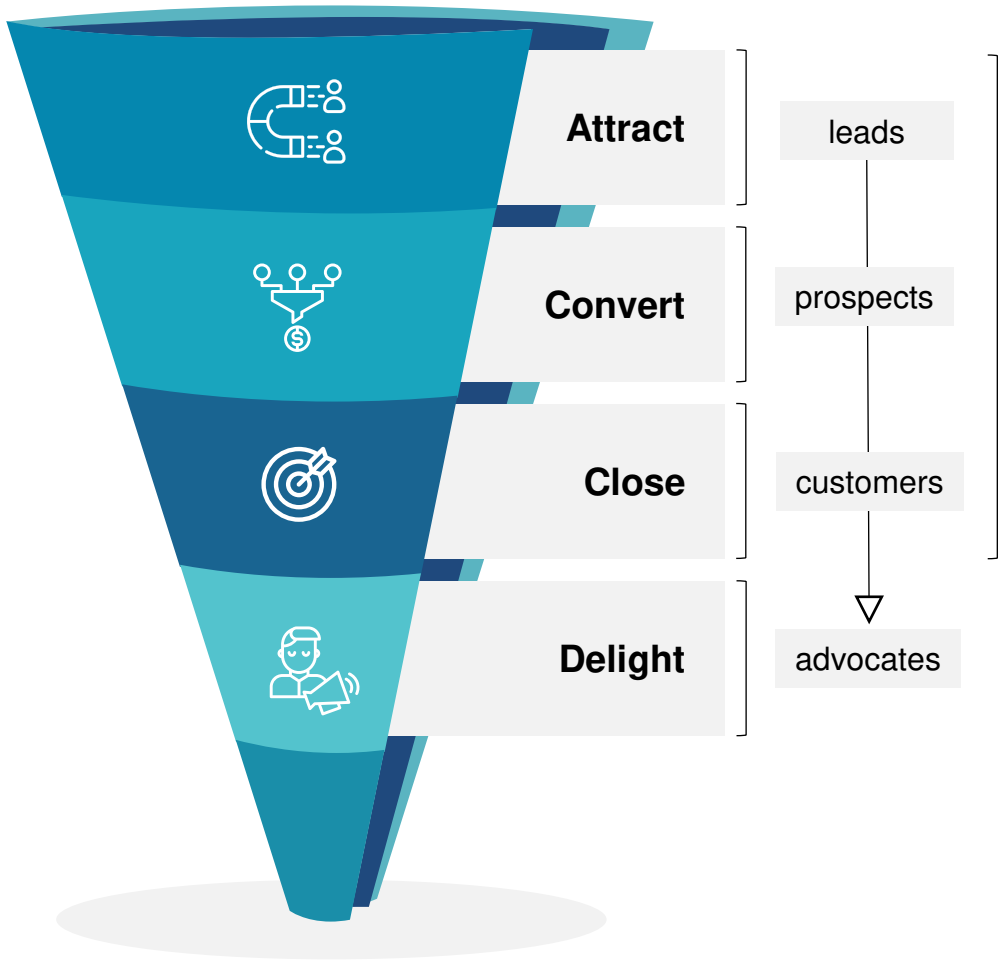
Leading to a high number of users:

Due to the mentioned factors, the CCCS providers can address and obtain a way higher user base and ultimately increase the probability of having a real impact on the reduction of CO2 emissions

Source: Interview with Ilona Kivimäki (2020).

A customer acquisition strategy is necessary to reach the target number of users by 2030 to mitigate climate change on a larger-scale

Overview of two inbound marketing strategies tackling different steps in the customer journey:



Award/Loyalty Program

- Award points to be earned when customers accomplish a change of behaviour

  - When they realize **green purchases.**
  - When they make **sustainable actions** such as recycling. **Possibility of building partnerships with innovative apps that keep track of recycling activity** (e.g. Greenopolis, TerraCycle)

- Various levels of points to be reached to benefit from discounts across the 4 categories (transportation, nutrition) in the forms of **discounts** and shopping vouchers in certain stores

Referral Marketing Program

- **Grow customer base** by encouraging existing users to introduce the platform to a family member, friend, contact through word-of-mouth initiatives (traceable link)

  - Existing users participate to **raise funds allocated to sustainable funds/offsetting projects.**
  - Example: "*€10 will be automatically invested by the brand in a sustainable fund or offsetting project if a contact of yours joins the app*."

Source: Hubspot (2020) and J. Sanders (2010).

Collaborating with multichannel marketing platforms such as Payback could tackle the indexes' limitations in terms of data accuracy

Explanation of Payback as a potential collaboration opportunity to increase index accuracy

Problem

Lack of accuracy of the indexes as CCCS players do not have sufficient information on the products that the consumers buy.

Mitigation

Possible **collaboration with Payback**, which have more detailed information on the products that are bought.

Limitations

- Payback might not have the data for all retailers
- Payback only knows details about the product groups/categories but does not provide exact product information.

Collecting Points

Use of **PAYBACK card** to collect points from over **680 partner companies** (groceries, fuel, entertainment, travel, apparel…)

Data Mining

PAYBACK can track which **product groups or product categories** the customer is buying.

Data Sharing

Collaboration to **exchange of market data** (buyer profiles, detailed product groups & product categories) for a **more accurate** carbon measurement

Increasing User Base

Collaboration might help to **increase the penetration rate** of CCCS usage.

Source: Payback (2020).

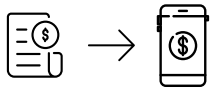
Collaborating with digital receipts providers could tackle the indexes' limitations in terms of data accuracy and allow a tailored measurement of carbon emissions

Identification of two types of digital receipt providers and overview of two respective strategies:

Context - Market Dynamics

- Increasing share of cash-less and mobile payments
- Growing investment in R&D in the retailing industry
- Raise of climate awareness

Strategy - Collaboration with **external** digital receipt providers



- External providers such as *Kivra* has been distributing digital receipts for Sweden's largest retailer. Has been managing over 2.5 million invoices every month and accounts 3.7 million of users
- Invoices' **payment, collection, storage and management** can be done through the platform
- Collaborating with such entities would potentially **enhance the carbon measurement accuracy.** More advanced identification and differentiation of the item's carbon level

Strategy - Collaboration with **internal** digital receipt providers

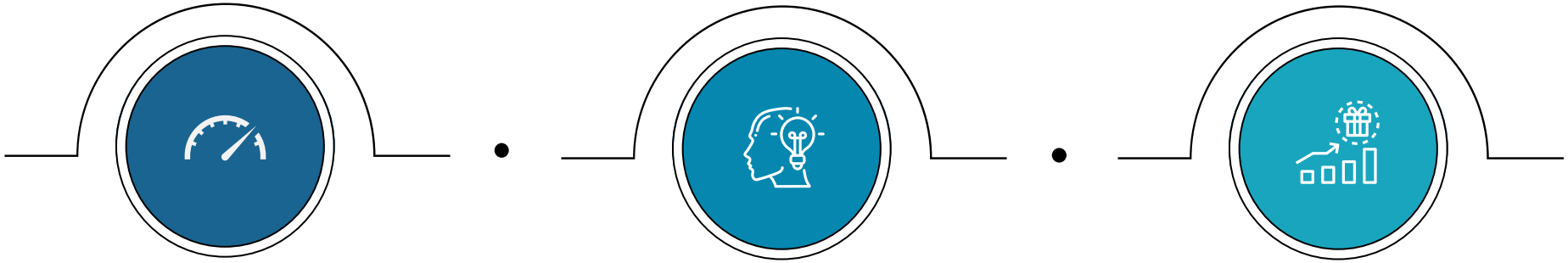
- **Retailers' reluctance** to adopt third parties' services: **loss of monopoly on the collection of consumer data**
- Development of **self-scanning** tools, **connected to** the **customer loyalty card**, and **apps** (iBeacon by Carrefour) that **collect data** about **consumer behaviour and purchasing patterns** to offer tailored in-store routes and promotions to customers
- Collaborating with retailers that have been implementing such tools would **strengthen indexes' accuracy** and offer a more **precise carbon measurement**

Source: Deloitte (2017) and Kivra (2020).

Setting an imaginary limit with notifications on the credit card for carbon emissions can increase the consumer awareness and incentivize a change

The carbon meter

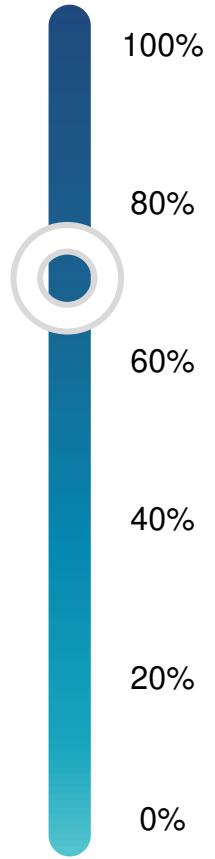
Individual Limit → **Awareness** → **Incentives**



- A limit is already implemented by Doconomy, **disconnects the card once the limit is reached**, forcing card holder to use another credit card
- **Not accurate record of user's footprint** after the limit is reached
- **Imaginary** max carbon limit

- **Increase** visibility of behaviours.
- Today´s short attention span requires **repetitive and easy messages** presented visually to **keep user interest high**

- The carbon meter pushes the user **to keep emissions under a set level** through a change of behavior



The Carbon Meter

The display of the environmental damage cost would influence users to lessen their carbon footprint by offsetting and reconsidering their next expenditures

Overview of the integration of the damage cost that ties in with a framework:

Damage cost is the **cost incurred** by **repercussions of direct environmental impacts** (e.g. emissions of pollutants) such as the degradation of land or human

PROCESS

Awareness & Education	Call to Action	Advocacy & Change
• Offer the **transparency and information openness** increasingly **sought by consumers** • **Educate** users towards the impact a good has on the environment throughout its entire life cycle	• When money **allocation cannot be changed, encourage users to make up** for their non-sustainable consumption though offsetting • Influence **users to act upstream toward their future consumption**	• **Weaken consumer loyalty** for companies at the root of negative environmental impact • Users' commitment would **influence more individuals** to follow a similar path • **Corporate adaptation** to meet consumers' demand

Source: OECD (2001).

The constant visibility of carbon expenditure would ultimately influence users to reduce their carbon footprint by offsetting their CO2 emissions immediately

Constant encouragement and reminders would incentive users to offset:

Direct Access to the Offsetting Platform

from the client **application** and **notifications** when clicking on the following icon:

- Enhancement of user experience: reduction of number of clicks: a facilitated process: **simple** and **fast**
- Users do **not get lost** and **have less time to change their mind** in the process through intermediate pages and redirects

Notifications Conveying the Message

- Clear **overview** of carbon emissions associated to recent purchases
- **Monthly summary** and monitoring of the carbon emissions' evolution: is the user on the right track?
- **Call to Action**: "*Offset Now!*"
- **Constant visibility** of the offsetting **icon** offering a direct access and continuously incentivizing users to reduce their individual carbon footprint

Source: Dezeen (2019).

By creating a community and a social platform through gamification the CCCS providers can increase both interest and user experience

Gamification as seen from the RAMP framework

Relatedness

Community

A community lets users interact both with each other and the brand. It creates a place for members to share what they love, dislike, ask questions and receive answers.

Competition

Competition allows users to prove themselves against other members. A way to earn symbolic rewards and to spur each other to do better and further decrease the individual footprint.

Mastery

Education

Educational videos and readings to raise awareness and teach users about the rising carbon emissions and how to mitigate them through simple actions.

Challenges

Challenges to boost interest, test the knowledge learned through offered education and earn rewards and badges for accomplishments.

Autonomy

Exploration

An explorational virtual world where the users are given room to move and express their creativity. Let them be a part of the movement not just as members but as co-creators.

Game Avatar

Allow for personalization. Game avatars to represent the personality of members as well as enable geographical location to connect and compare with people around the world.

Purpose

Decarbonizer

Display the decrease in carbon emissions of members and their friends to highlight the impact created and the importance of what they do.

Share

Enable sharing performance on main social media platforms. It increases incentives as most people share to give a sense of who they are and what they care about.

Source: Medium (2019).

Even though the CCCS providers can have a substantial impact on EU CO2 reductions, there might be the need for more severe actions to reach the goals

Outline of a mandatory carbon limit for consumers as a more severe initiative

A more severe initiative might be required

Impact assessment:
The model has shown that CCCS can have a substantial impact due to increased consumer awareness and a possible shift towards more sustainable behavior.

Yet even the impact of the best-case scenario is not sufficient on its own to reach the sustainability goals and prevent the irreversibility of climate change.

Possible initiative:
A more severe initiative could potentially help to resolve the insufficiency:

A mandatory carbon consumption limit for individuals

Leading to potential change on consumer and company level

Decreases the amount of (unsustainable) products & services a consumer can purchase (additional limit to monetary limits)

Ultimately **incentivizes companies** to have a more sustainable production chain in order to sell same basket as currently.

Could result into **carbon emissions trading scheme** also on consumer level
→ Allowing excess emissions by purchasing unused allowance of others

Ultimately leading to a tradeoff-decision for humankind

Saving the planet
- Severe changes are necessary to prevent the outcome of current developments
- Climate change prevention should be the main goal of humankind

VS

Radical change of society
- Is a further limitation and ultimately governmental surveillance a price worth to pay for avoiding climate change?
- Do we want to live in a world in which the government has control over purchasing decisions?

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Adding a mandatory carbon limit in addition to the monetary limit of consumers would incentivize companies to reduce emissions during the production stage

Explanation of the possible effects of a mandatory carbon limit

Current situation

Consumers

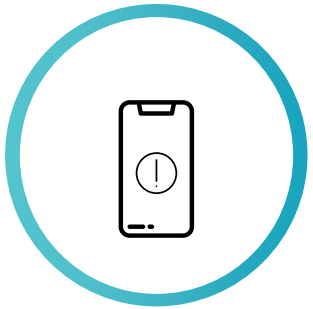
Only face a **monetary budget constraint** while shopping.

Companies

Main objective: high **sales and profit**.

Possible necessary future situation

Mandatory carbon limit



Decreases the amount of **goods** a consumer can **purchase.**

Driving…

Corporate change

The constraint would **incentivize companies to reduce production emissions in order to sell the same basket as before.**

Resulting in…

Climate Change Mitigation

Also **opens** for an **individual carbon emission trading market**

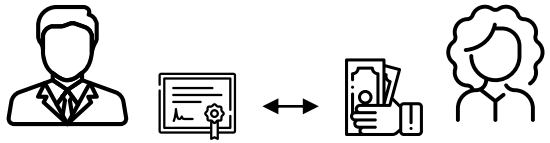
The concept of emission trading systems could be applied for consumers in order to foster sustainable purchases

Explanation of the functionality of an emission trading system on consumer level

- Relevance of emissions trading at the consumer's level?
- Integrated within the CCCs platform.

Excess emissions

Carl only purchases a **small basket** of goods with **sustainable** products and therefore has **remaining emissions certificates**



Emissions trading

Carl **sells his remaining certificates** to Julia in order to allow Julia to purchase her desired basket

- Incentive for Julia **to buy more sustainable** and affordable purchases
- Disadvantage for Julia as she needs to spend more money to purchase her basket

Unused allowance

Julia purchases a **big basket** of goods which she cannot afford with her own emissions certificates